Commonwealth of Kentucky
Division for Air Quality
PERMIT STATEMENT OF BASIS

TITLE V DRAFT PERMIT NO. V-06-001
GALLATIN MATERIALS, LLC
VERONA, KENTUCKY 41092
AUGUST 2, 2006
ROBERT L. WILLIAMS, REVIEWER
PLANT I.D. # 21-077-00031
AI # 71400

A. SOURCE DESCRIPTION:

Gallatin Materials, LLC in Verona, Kentucky submitted an application for the construction and operation of a lime manufacturing facility on May 4, 2005. Gallatin Materials will install two new rotary kilns capable of producing 840 tons of lime per day each, for a total of 1,680 tons of lime per day. They will be operating in conjunction with Sterling Ventures LLC, who will supply the limestone for Gallatin Materials, LLC. Any limestone, after screening by Gallatin Materials, that is considered too large or too small for Gallatin's use will be returned to Sterling Ventures. This permit is being issued as a combined PSD and Title V permit.

B. COMMENTS:

Type of Control and Efficiency

The particulate emissions from the conveyors are controlled by water spray (control efficiency of 90%), moist material (control efficiency of 90%), enclosures (control efficiency of 90%) and/or baghouses (control efficiency of 99.9%). In addition to the aforementioned controls Gallatin Materials will also be utilizing a vacuum system for the kilns, lime product processing facilities, and truck loadouts. The captured fugitive emissions can either be returned to the system for processing or loaded into a truck for disposal. Any reject material will be disposed of by returning it back to the mine. If any of the controls listed by the company in the application prove to be inadequate to meet the emission requirements listed in the permit, the Division reserves the right to require another form of "control equipment" be utilized to meet the permit requirements.

The CO, NO_x, and VOC emissions have no controls assigned to them. They will be controlled by equipment design and operating the respective equipment in accordance with the manufacturer's specifications and standard operating procedures at all times.

The SO_2 emissions are controlled by scrubbing with lime dust in the process (control efficiency of 95%).

The emissions from haul roads (paved) are controlled by a wet suppression method (water truck) and sweeping. The paved haul roads have a control efficiency of 90%.

See BACT discussion below for further details.

B. COMMENTS:

EMISSION FACTORS AND THEIR SOURCE

Emission Factors from AP-42, Chapter 11.17, Lime Manufacturing, were used for the lime processing, including the hydrate plant. The Emission Factor listed under “Coal-fired rotary preheater kiln with dry PM controls” was utilized for SO_2. Since “No Data” was listed under this category for NO_x and CO, emission factors listed under “Coal-fired rotary kiln” were utilized.

Emission Factors for limestone and coal are the standard factors used for those industries in the State of Kentucky by the Division for Air Quality’s Minerals Section.

Fugitive emissions were counted in the calculation of potential to emit (PTE) in making the PSD applicability determination as this source is one of the 26 listed categories as referenced in 401 KAR 51:017, Section 7.

APPLICABLE REGULATIONS

The Limestone Handling is governed by **401 KAR 63:010**, Fugitive emissions; **40 CFR 63, Subpart AAAAA**, National Emissions Standards for Hazardous Air Pollutants for Lime Manufacturing Plants; and **401 KAR 51:017**, Prevention of significant deterioration of air quality. Pursuant to 40 CFR 60.670(a)(2), **401 KAR 60:670**, New nonmetallic mineral processing plants (40 CFR 60, Subpart OOO as modified by Section 3 of 401 KAR 60:670) does not apply as a screening operation is the only limestone processing being utilized by Gallatin Materials, LLC. Any crushing of limestone utilized by Gallatin Materials, LLC is done by Sterling Ventures LLC.

The Coal / Coke Handling is governed by **401 KAR 60:005**, Standards of performance for new stationary sources, which incorporates by reference 40 CFR 60.250 (40 CFR 60, Subpart Y); **401 KAR 63:010**, Fugitive emissions; and **401 KAR 51:017**, Prevention of significant deterioration of air quality.

Kilns #1 and #2 are governed by **401 KAR 60:005**, Standards of performance for new stationary sources, which incorporates by reference 40 CFR 60.340 (40 CFR 60, Subpart HH); **40 CFR 63, Subpart AAAAA**, National Emission Standards for Hazardous Air Pollutants for Lime Manufacturing Plants; and **401 KAR 51:017**, Prevention of significant deterioration of air quality.

The Lime Handling is governed by **401 KAR 59:010**, New process operations; **401 KAR 63:010**, Fugitive emissions; and **401 KAR 51:017**, Prevention of significant deterioration of air quality.

The Lime Additives System is governed by **401 KAR 59:010**, New process operations; **401 KAR 63:010**, Fugitive emissions. **401 KAR 60:670**; and **401 KAR 51:017**, Prevention of significant deterioration of air quality. New nonmetallic mineral processing plants (40 CFR 60, Subpart OOO as modified by Section 3 of 401 KAR 60:670) does not apply as there are no crusher or grinding mills associated with this operation. **40 CFR 63, Subpart AAAAA**, National Emission Standards for Hazardous Air Pollutants for Lime Manufacturing Plants, does not apply as this material is not fed into a kiln. It is added to the post kiln lime product.

B. COMMENTS:

APPLICABLE REGULATIONS (CONTINUED)

The Hydrate Plant is governed by **401 KAR 59:010**, New process operations; **401 KAR 63:010**, Fugitive emissions; and **401 KAR 51:017**, Prevention of significant deterioration of air quality.

Emissions coming from the trucks, unless they are completely enclosed will be considered fugitive and are therefore governed by **401 KAR 63:010**, Fugitive emissions; and **401 KAR 51:017**, Prevention of significant deterioration of air quality. The baghouse controls listed in the permit for the associated loadouts end at the telescoping loading chutes.

C. PSD REVIEW:

Applicability

Gallatin Materials, LLC falls under one of the 26 listed major source categories under PSD and is located in Gallatin County, a county classified as attainment pursuant to Regulation 401 KAR 51:010. Gallatin Materials, LLC is also major in a PSD category (>250 tons / year) with respect to particulate matter, CO, NOx, and SO2 emissions.

Since Gallatin Materials, LLC is a new major source subject to PSD, it must apply the Best Available Control Technology (BACT) for each pollutant that it will emit in significant amounts as defined in Regulation 401 KAR 51:017.

A PSD Review involves the following six requirements:

1. Demonstration of the application of Best Available Control Technology (BACT).
2. Demonstration of compliance with each applicable emission limitation under Title 401 KAR Chapters 50 to 63 and each applicable emission standard and standard of performance under 40 CFR 60 and 61.
3. Air quality impact analysis.
4. Class I area(s) impact analysis.
5. Projected growth analysis.
6. Analysis of the effects on soils, vegetation, and visibility.

This review demonstrates that all regulatory requirements will be met and includes a proposed permit which establishes the enforceability of all applicable requirements.

PSD Processes

The proposed permit will authorize the following processes which are subject to a PSD review:

1. Two Lime Kilns;
2. Material storage, transport, and handling equipment for the kilns' fuel, limestone, lime and hydrate; and
3. One emergency diesel generator,

C. PSD REVIEW: (CONTINUED)

PSD Pollutants

The table below lists the net significant levels in emissions for all PSD regulated pollutants.

PSD Significant Levels [1]

Pollutant	Significant Net Emissions Level (tons / year)	Potential Emissions Increase from the Proposed Facility (tons / year)
PM / PM_{10}	15	291.830 / 257.915
SO_2	40	108.657
H_2SO_4	7	1.1
NO_x	40	970.827
CO	100	464.289
VOC	40	37
Pb [2]	0.6	0.022

1. As relevant to proposed project
2. Pb emissions are for lead compounds although elemental lead is the PSD pollutant

   The annual emissions presented in this table were calculated based on maximum hourly emission rates after controls (the level of control required was determined through a BACT analysis, see **BACT Review**).

The maximum lime production rate from kilns #1 and #2 is 35 tons/hour, each. The particulate emissions from each kiln shall not exceed 0.10 lb/ton of stone feed. The visible emissions discharged into the atmosphere from each kiln shall not exceed 15% opacity when exiting from a dry emission control device. The uncontrolled emissions of carbon monoxide, nitrogen oxide, and sulfur dioxide from each kiln shall not exceed 52.5 lbs/hour, 108.5 lbs/hour, and 12.25 lbs/hour, respectfully.

The visible emissions associated with the Lime Handling and Hydrate Plant shall not exceed 20% opacity from a control device or stack associated with any affected facility. This includes baghouses, as well as vent filters.

BACT Review:

Pursuant to State Regulation 401 KAR 51:017, Section 9 (1) and (3), a major stationary source subject to a PSD review shall meet the following requirements,

1. The proposed source shall apply best available control technology (BACT) for each pollutant that it will have the potential to emit in significant amounts.
2. The proposed source shall meet each applicable emissions limitation under Title 401, KAR Chapters 50 to 63, and each applicable emission standard and standard of performance under 40 CFR 60 and 61.

The BACT analysis is performed based on the sources' submitted permit application (i.e., the kilns and the ancillary equipment needed to operate the new facility). Sources subject to PSD rules are required to undergo a BACT analysis for each pollutant for which there is a significant emissions increase. For new sources, the net emissions increase is equal to the proposed potential emission rate for the new source. The proposed source-wide emission rates are presented in Table 4-1 along with each pollutant's corresponding PSD significant emission rate. As described in the permit application the emissions of PM/PM10, SO_2, NO_x and CO exceed the significance level rate and therefore are subject to BACT review.

Gallatin Materials presented a study of the best available control technology for the emissions requiring BACT review in the permit application. The Division reviewed that study and made a determination of appropriate BACT technologies and emission limitations. A summary is presented below.

TABLE 4-34: BACT Selection for the Project

Pollutant	BACT Determination	Proposed BACT Limit
PM / PM_{10} (Lime Kilns)	Baghouse	0.2 lb / ton Lime – 24 hour (Filterable) *
PM / PM_{10} (Material Handling)	Baghouse or Bin Vent Filters or Fogging and / or Enclosures	Baghouse or Bin Vent Filters or Fogging and/or Enclosures **
PM / PM_{10} (Fugitive)	Suppressants and Compaction, Paved Roads, Chutes, Low Drops, Underground Reclaim (as practical and needed)	Proper Operation (Work Practice)
SO_2 (Lime Kilns)	CFB and Dry Scrubbing	0.35 lb / ton Lime – 30 day
NO_x (Lime Kilns)	Proper Design and Operation	4.0 lb / ton Lime – 30 day ***
CO (Lime Kilns)	Proper Design and Operation	3.0 lb / ton Lime – 30 day ***

* The proposed PM/PM10 limit is for filterable particulates only.

** The material handling BACT limits are source dependent and vary based on the type of

*** Due to the review of the modeling submitted by Kentuckiana Engineering having not been completed by US EPA Region IV or the Division at the time of the Public Notice of the Draft Permit, the BACT Limit for NO_x and CO will be 3.1 lb / ton Lime and 1.5 lb / ton Lime, respectively. These values were derived from a review of AP-42 and a chart submitted by Gallatin Materials as part of their BACT analysis in comparing the emissions of other lime manufacturing plant kilns.

C. PSD REVIEW: (CONTINUED)

BACT Review: (Continued)

Table 4-35: BACT Selection for the Emergency Generator

Pollutant	BACT Determination
PM / PM_{10}	Proper Design and Operation, Use of Low Sulfur Diesel, Limited to 500 Operating Hours
SO_2	
NO_x	
CO	

BACT PM / PM_{10} (Lime Kilns):

Table 4-7 reproduced from the Gallatin Materials permit application identifies the emission control options for Gallatin Materials, together with their respective efficiencies.

Table 4-7: Particulate Emission Control Options

Pollutant	Control Technology	Potential Control Efficiency (%) *
PM / PM_{10} (Kilns)	Baghouse ESP	99+ 99+
PM / PM_{10} (Material Handling)	Baghouse Enclosures Suppressants	90+ 90+ 90+
PM / PM_{10} (Fugitives)	Suppressants Compaction Low Drop Heights Paved Roads Drop Chute Stacker Tube	80+ Process Specific

* Dependent on fuel, size of units, and other operational and site specific characteristics.
Cooper, C.D. and F.C. Alley, AIR POLLUTION CONTROL: A Design Approach, Waveland Press, 1986

There are three (3) sources of particulate matter emissions from Gallatin Materials: the kilns, the material handling units, and fugitive sources.

Particulate matter emissions from the kilns is the result of material (often kiln dust) in the fuel which is not combusted, from fines on the limestone feed and from the calcined limestone which rises with the flue gases from the kiln. As illustrated in Table 4-7, a baghouse and an ESP have the highest control efficiency of any of the particulate matter control options that are technically feasible for a kiln. Under EPA's "top-down" approach these technologies must be considered first. If one of the top control technologies is selected for Gallatin Materials, further analysis of other options is not required.

BACT PM / PM_{10} (Lime Kilns): (Continued)

Pursuant to 40 CFR 63, Subpart AAAAA, the proposed Gallatin Materials kilns must be designed to meet the MACT standard of 0.1 lb/ton stone feed. Gallatin Materials has selected a baghouse as the control technology for PM/PM_{10} emissions from the kilns with a corresponding BACT limit of 0.1 lb/ton stone feed (filterable particulate) based on a 24-hr average. Performance testing, as outlined in the permit, will determine if they are in compliance with this limitation, and if further controls will be required.

In accordance with EPA guidance, the remaining control options were not considered further in the BACT analysis for the lime kilns since the top control technology (Fabric Filter Baghouse) representing the maximum reduction of PM/PM_{10} was selected as BACT.

BACT for PM/PM_{10} (Material Handling):

Particulate matter emissions from material handling results from dust generated in the handling and moving of the fuel, kiln dust, lime and limestone. A baghouse, vent filters and fogging share the highest control efficiencies of any of the particulate matter control options for material handling (e.g., conveyance, transfer and crushing).

Gallatin Materials has selected baghouses, bin vent filters and fogging (in combination with full and partial enclosures when feasible) as BACT for PM/PM_{10} emission controls from material handling facilities for fuel, lime, limestone, and kiln dust. Fogging will be used for fuel and limestone dust in instances where it provides controls equal to or better than a baghouse or filter and is feasible.

The methods of control proposed for material handling for the fuel and limestone are used throughout the coal and limestone industry and are recognized as acceptable methods for the control of particulate emissions for those operations if utilized properly. Baghouses and bin vent filters are used throughout the lime industry for the control of particulate matter emissions and can be effective if utilized properly. Performance testing, as outlined in the permit, will verify if the controls are adequate to meet the emission limitations requirements, and if further controls will be required.

Based on the selection of the top control technologies and according to EPA guidance, no additional analysis is required.

BACT PM / PM_{10} (Fugitive): (Continued)

The most likely material to be a fugitive dust problem is dry material with a large amount of fine particles. To minimize fugitive dust the facility should continually endeavor to contain dry materials or change its condition so it has a greater tendency to stick together. Fugitive dust emissions from the proposed facility can result from exposure of active and inactive fuel, kiln dust or limestone storage piles, the operation of front end loaders, dozers, and trucks, road traffic, and some silo and conveyor unloading and loading operations. The most commonly employed control options for fugitive dust emissions are: the application of wet suppressants (both water and chemical), material compaction, and the use of telescopic chutes, stacking tubes, and other reduced material drop height designs and the paving of roads.

Gallatin Materials has proposed to use all of the above control methods, as practical, to minimize fugitive dust emissions. As stated in the proposed permit under **Operating Limitations**, regarding all fugitive emission sources, the open stockpiling, or accumulation on, under, or against pieces of equipment or structures, of lime material (product that has fallen from a conveyor system, reject material, hydrate, or any other form of lime) is prohibited. Coal and petroleum coke are stored in silos for just in time delivery. Therefore there should be no stockpiling of coal / petroleum coke. The stockpiling of limestone will utilize a concrete bunker and one fines stockpile. The controls for the bunker are partial enclosure with water atomizers, and the control of the one limestone stockpile will be wet suppression. Drop heights will be optimized to reduce emissions while allowing for proper operation. In addition, Gallatin Materials will pave all permanent roads and parking lots and utilize wet suppression as needed to further reduce road dust emissions.

BACT for SO_2 (Lime Kilns):

The generation of SO_2 is directly related to the sulfur content and Btu value per pound of the fuel burned. This permit application is based on the estimated worst-case heating value and composite sulfur content reasonably anticipated. The design of the project will allow for maximum reduction of SO_2 from the estimated worst-case heating value / sulfur content fuel.

SO_2, and to a lesser extent the various other related molecules designated together as SO_x, have been the major emission concern from lime kilns for decades. SO_2 and SO_3 are formed during combustion. SO_3 is the precursor to H_2SO_4. The design of the lime kilns provides a significant level of SO_2 and SO_3 control as a result of the co-combustion of the limestone/fuel mixture in the kiln and the use of fabric filters as particulate control, which collect sulfates resultant from the lime scrubbing of SO_2.

Gallatin Materials has selected proper design and operation as BACT for SO_2 emissions. This decision is based on the finding that fabric filtration and its inherent design allows direct removal of SO_2 by the lime and this has the greatest reduction and has recently been determined through PSD review to be BACT for lime kilns (See Table 4-9 in the permit application). As discussed earlier, lime kilns essentially behave similar to a dry scrubbing device. Limestone and lime are in intimate contact with the combustion gases as they pass along a counter current flow path through the kiln. As combustion gases exit the kiln and move up through the preheater further contact with the partially calcined limestone occurs.

BACT for SO_2 (Lime Kilns): (Continued)

The wide temperature profile across the limestone bed in the preheater and the presence of highly reactive lime mimic the conditions within a dry scrubber. The SO_2, now reacted with the lime dust is carried with the exhaust gases into the fabric filter baghouse where it is collected on the filter cake. SO_2 is collected on the surface of the limestone in the preheater and then enters the kiln as the stone moves from the preheater to the kiln. In the tumbling action within the kiln the surface coating containing the collected SO_2 becomes dust, is entrained in the kiln exhaust gases and recirculated. This recirculation continues to scrub the gas and reduce SO_2 emissions.

Performance testing, as outlined in the permit, will determine if the control contained in this permit is adequate, and if further controls will be required.

BACT for NO_x (Lime Kilns):

Nitrogen Oxides ("NO_x") is formed in the combustion process from two sources: fuel content NO_x and thermal NO_x from the nitrogen content of the combustion air. Fuel content NO_x is inherent in the combustion process; thermal NO_x is a function of the combustion temperature and amount of excess air. The same factors that inhibit CO emissions (i.e., high temperature and high excess air) increase thermal NO_x.

Control methods for NO_x can be divided into three areas: kiln technology, combustion control and post-combustion control. Kiln technology control for NO_x starts with the basic choice between preheater and non preheater technology. The selection of preheater kiln technology reduces the input heat required for the calcinations of lime as compared to a conventional long kiln. The increased thermal efficiency of a preheater kiln system reduces the consumption of fuel and thus reduces the NO_x produced on a unit of production basis. As discussed previously in the permit application, Gallatin Materials has chosen the preheater kiln technology.

Gallatin Materials reviewed several other technologies for reducing NO_x and these are described in detail in the permit application. The following table lists the control technologies with the advantages and disadvantages:

BACT for NO_x (Lime Kilns): (Continued)

Control Method	Determination
Proper Design and Operation	**Selected as BACT.** Best suited for lime kiln operation. BACT/LAER Clearinghouse shows proper design and operation as the only method feasible for NO_x control.
NO_x Burner (LND)	**Not Suitable.** This technology is not proven.
Oxidation / Reduction (O/R) Scrubbing	**Not Suitable.** Average removal cost of \$5,100 per lb of NO_x make this not economically viable. This technology is not listed on the RBLC database.
Selective Catalytic Reduction (SCR)	**Not Suitable.** Average removal cost of \$4,328 per lb of NO_x make this not economically viable. This technology is not listed on the RBLC database.
Selective Non-Catalytic Reduction (SNCR)	**Not Suitable.** Average removal cost of \$6,616 per lb of NO_x make this not economically viable. This technology is not listed on the RBLC database.
Non-Selective Non-Catalytic Reduction (NSNCR)	**Not Suitable.** Technology is not proven and not transferable to lime kilns. This technology is not listed on the RBLC database

The BACT analysis presented in Gallatin Materials application states that lime preheater kilns produce inherently lower thermal NO_x than other combustion sources (e.g. pulverized coal boilers) due to their lower fuel consumption. None of the lime manufacturing facilities have installed control equipment for NO_x and rely on emission factors, fuel characteristics and other design information that may affect NO_x formation to establish their permitted emission rates. Proper kiln design and operation is supported by all recent determinations in the RBLC database. Considering these factors and the high cost of alternatives, proper kiln design and operation is deemed BACT for the proposed kilns

The Division has reviewed reports by LWB Refractories (March 31, 2006) and the National Lime Association (March 30, 2006) that were submitted by Kentuckiana Engineering on behalf of Gallatin Materials which discuss studies with regard to Selective Catalytic Reduction (SCR) and Selective Noncatalytic Reduction (SNCR) for lime kilns. Both reports conclude that these two control methods for NO_x are not viable for lime kilns. Due to the costs listed in the reports, the Division will agree that SCR and SNCR are not viable options for lime kilns. With regards to oxidation/reduction scrubbing (O/R), the Division has reviewed the analysis submitted by Gallatin Materials and concludes that O/R is not economically viable.

Performance testing, as outlined in the permit, will determine if the control proposed by Gallatin Materials is adequate, and if further controls will be required.

BACT for CO (Lime Kilns):

Carbon monoxide is a product of incomplete combustion. One solution is to operate with higher amounts of excess air, but more excess air often results in higher NO_x emissions. Gallatin Materials reviewed several other technologies for reducing CO, and these are described in detail in the permit application. The following table lists the control technologies with the advantages and disadvantages:

Control Method	Determination
Excess Air	**Not Suitable.** Excess air increases fuel use, increases NO_x, PM_{10}, and SO_2. This technology is not listed on the RBLC database.
Proper design and Operation	**Selected as BACT.** Best suited for lime kiln operation. BACT/LAER Clearinghouse shows proper design and operation as the only method feasible for CO control.

The Gallatin Materials application states that technologies such as Thermal Oxidation (TO) and Catalytic Incineration (CI) were not included in the list because they had never been used on a lime kiln. Since they had never been used they were considered unproven and not commercially available. Because of this, the economic analysis included in the application, and the lack of natural gas service (required for TO), the Division concluded that proper design and operation is BACT for CO at Gallatin Materials.

As mentioned previously, the lime kilns, utilizing preheater technology, will be designed to operate at reduced heat levels and are subject to slightly higher CO for the sake of lowering other emissions such as thermal NO_x; any additional reduction of CO emissions through extra excess air would be counterproductive in light of EPA's emphasis on reducing NO_x emissions. For these reasons, excess air is not considered BACT for CO emissions from the Gallatin Materials lime kilns.

Performance testing, as outlined in the permit, will determine if the control is adequate, and if further controls will be required.

BACT for Emergency Generator:

The proposed facility will be equipped with a 0.5 MMBtu/hr, 150 HP, diesel generator. This generator will only be operated in an emergency power outage (and for short test periods) to keep the kilns rotating during power outages to preserve the integrity of the refractory and to prevent damage to other components. Gallatin Materials has proposed to limit the operation of the generator to less than 500 hr/yr. This is similar to other sources that have recently been permitted in Kentucky.

MACT Compliance

Pursuant to section 112(f) of the CAAA, a MACT applicability determination must be made by the permit applicant for each new unit that represents a major source of HAPs which has an applicable promulgated standard. Gallatin Materials is subject to the MACT requirements found in 40 CFR 63 Subpart AAAAA.

Pursuant to 40 CFR 63, Subpart AAAAA, Gallatin Materials must limit its particulate matter emissions from each kiln to not exceed 0.10 lb/ton of stone feed. They have proposed to comply with this limitation by the use of baghouses. Performance testing, as outlined in the permit, will determine if they are in compliance with this limitation.

Pursuant to 40 CFR 63, Subpart AAAAA, Gallatin Materials must limit its fugitive emissions from all processed stone handling ("PSH") operations to not exceed 10 percent (10%) opacity. Gallatin Materials has proposed to comply with this limitation by the use of partial enclosures and water atomizers.

In addition to emission standards contained in Subpart AAAAA, Gallatin Materials will conform to the applicable recordkeeping, monitoring and reporting requirements once in operation per regulation, as stipulated in the permit.

Air Quality Impact Analysis

Pursuant to Regulation 401 KAR 51:017, Section 12, an application for a PSD permit shall contain an analysis of ambient air quality impacts in the area that the proposed facility will affect for each pollutant that it will have the potential to emit in significant amounts as defined in Section 22 of the same regulation. The purpose of this analysis shall be to demonstrate that allowable emissions from the proposed source will not cause or contribute to air pollution in violation of:

1. A national ambient air quality standard in an air quality control region; or
2. An applicable maximum allowable increase over the baseline concentration in an area.

1. Modeling:

The Class II analysis includes a Preliminary Impact Assessment ("PIA") and a Full Impact Analysis ("FIA"), if the PIA identifies that requirement. If a FIA is required for both short term and long term NAAQS and PSD Increment averaging periods, short term emission limits are used for comparison to short term averaging periods and long term emission limits are used for comparison to long term averaging periods. Gallatin Materials performed the required modeling as described below.

Air Quality Impact Analysis (Continued)

A load model analysis was performed with the kilns operating at the following capacities. The results of the load analysis are described below.

a. Two Kilns at 100% Load
b. Two Kilns at 75% Load
c. Two Kilns at 50% Load
d. One Kiln at 50% Load
e. One Kiln at 100% Load

CO: The two kilns at 100% Load case represents the maximum predicted impacts for CO

PM_{10}: The PM_{10} impacts are affected by sources other than the kilns and are not dependent on the kiln Loads

NO_x: Since NO_x is an annual average, the two kilns at 100% load was used to ascertain the maximum annual impacts for NO_x.

SO_2: The short term impacts from the two kilns at 100% load case represent the maximum impacts. The annual impact is highest from the two kilns at 75% load case. Therefore for NAAQS and Increment Modeling, the two kilns at 100% load parameters will be used for the short term impacts and the two kilns at 75% load parameters will be used for the annual impacts.

Air Toxics: The two kilns at 100% load case results in the maximum predicted 24 hour impacts and two kilns at 75% load results in the maximum annual impacts for Air Toxics.

Preliminary Impact Analysis:

In accordance with the New Source Review ("NSR") Manual, a PIA was performed to determine if the predicted impacts equal or exceed the Significant Impact Levels ("SIL") as contained within the NSR Manual.

All predicted High First High ("HFH") and High Second High ("HSH") impacts for the short term averages and the High First High for the annual impacts were within the fence line grid.

Since the grid is made up of receptors placed on 100 metering spacing, no refined modeling was required to ascertain the point of maximum impact.

The modeled impacts for PM_{10} from the proposed Gallatin Materials site will exceed the SIL and the SMC. Therefore, a full impact analysis is required for PM_{10}.

Air Quality Impact Analysis (Continued)

1. Modeling: (Continued)

Preliminary Impact Analysis: (Continued)

The predicted impacts for CO from the proposed Gallatin Materials site will be less than the SIL and SMC. Therefore, neither a full impact analysis nor preconstruction monitoring is required for CO.

The predicted impacts for NO_x from the proposed Gallatin Materials site will be greater than the SIL but less than the SMC. Therefore, a full impact analysis will be required, but pre-construction monitoring is not required for NOx.

The predicted impacts of SO_2 from the proposed Gallatin Materials site will exceed the SIL for the 24-hour impacts. However, the SMC is not exceeded. Therefore, a full impact analysis is required and pre-construction monitoring does not have to be addressed.

Significant Impact Area:

The PIA also determines the SIA for those pollutants requiring a FIA. The SIA is determined for each pollutant that equals or exceeds the SIL. The SIA was determined for each load scenario using the Lakes Environmental software package.

PM_{10} SIA Results:

The SIA was determined for PM_{10} for both the 24-hour average ("HFH") and the Annual Arithmetic Mean ("AAM"). Additionally, since Gallatin Materials and Sterling Ventures emissions were modeled separately, there are tables in the **REVISED AIR QUALITY ANALYSIS** demonstrating that the emissions from the Sterling Ventures facilities used for support to Gallatin Materials do not affect the SIA determinations. As shown in Table 7-27 in the **REVISED AIR QUALITY ANALYIS**, the SIA for PM_{10} is 0.40 KM.

SO_2 SIA Results:

The SIA was determined for SO_2 for the 3-hour average (HFH), 24-hour average (HFH) and the AAM. Based on Table 7-28 in the **REVISED AIR QUALITY ANALYIS**, the SIA for SO_2 is 0.49 KM. Only the 24-hour HFH value for 1988 and 1990 exceed the SIL for SO_2, and therefore these values determined the SIA for SO_2.

Air Quality Impact Analysis (Continued)

1. Modeling: (Continued)

NOx SIA Results:

The SIA was determined for NO_x for the AAM. Based on Table 7-29 in the **REVISED AIR QUALITY ANALYIS**, the SIA for NOx is 3.39 KM.

Full Impact Analysis:

If a SIL is equaled or exceeded by a given pollutant, then a FIA is performed for that pollutant at its corresponding averaging time. The FIA involves the following:

a. Modeling for Compliance with the National Ambient Air Quality Standards ("NAAQS")

b. Modeling for Compliance with the allowable Prevention of Significant Deterioration ("PSD") increment consumption. As outlined above, the emissions of PM_{10}, SO_2, and NO_x exceed the SIL. Therefore, a FIA is required for PM_{10}, SO_2, and NO_x.

2. NAAQS:

PM_{10} NAAQS Compliance:

A summary of the PM_{10} NAAQS modeling results are shown in Table 7-35 from the **REVISED AIR QUALITY ANALYIS**.

Table 7-35: Summary of PM_{10} NAAQS Modeling Results

Averaging Times	Gallatin Materials Plus NAAQS Sources Impacts ug/m^3	Monitored Background ug/m^3	Total Impact Including Monitored Background ug/m^3	NAAQS Standards ug/m^3
24-hour HSH	44.42	55	99.42	150
Annual	3.58	20	23.58	50

Based on the results in Table 7-35, the PM_{10} emissions from Gallatin Materials are in compliance with the NAAQS after analyzing the contributory impact of all other NAAQS sources and including the monitored values from the Campbell County monitor as background.

SO_2 NAAQS Compliance:

A summary of the SO_2 NAAQS modeling results are shown in Table 7-38 from the **REVISED AIR QUALITY ANALYIS**.

Air Quality Impact Analysis (Continued)

2. NAAQS: (Continued)

SO_2 NAAQS Compliance:

Table 7-38: Summary of SO_2 NAAQS Modeling Results

Averaging Times	Gallatin Materials Plus NAAQS Sources Impacts ug/m^3	Monitored Background ug/m^3	Total Impact Including Monitored Background ug/m^3	NAAQS Standards ug/m^3
3-hour HSH	479.77	0.077 x 2620 = 201.74	681.51	1300
24-hour HSH	86.98	0.027 x 2620 = 70.74	157.72	365
Annual	16.39	0.005 x 2620 = 13.10	29.49	80

Based on the results in Table 7-38, SO_2 emissions from Gallatin Materials are in compliance with the NAAQS after analyzing the contributory impact of all other NAAQS sources and including the monitored values from the Campbell County monitor as background.

NO_x NAAQS Compliance:

A summary of the NO_x NAAQS modeling results are shown in Table 7-41 from the **REVISED AIR QUALITY ANALYIS**.

Table 7-41: Summary of NO_x NAAQS Modeling Results

Averag ing Times	Gallatin Materials Plus NAAQS Sources Impacts ug/m^3	Monitored Background ug/m^3	Total Impact Including Monitored Background ug/m^3	NAAQS Standards ug/m^3
Annual	12.43	0.011 x 1884 = 20.724	33.15	100

Based on the results in Table 7-41, NO_x emissions from Gallatin Materials are in compliance with the NAAQS after analyzing the contributory impact of all other NAAQS sources and including the monitored values from the Sangamon monitor as background.

Air Quality Impact Analysis (Continued)

2. NAAQS: (Continued)

PM10 Increment Consumption:

Table 7-44 from the **REVISED AIR QUALITY ANALYSIS** is reproduced below in a simplified format to show the PM10 increment consumption for the indicated years.

Year	Increment	24-Hour Limit - 30	Annual Limit – 17
1986	HFH	22.08	3.49
	HSH	19.81	
1987	HFH	22.82	3.66
	HSH	20.3	
1988	HFH	16.86	3.84
	HSH	14.84	
1989	HFH	23.78	3.54
	HSH	14.5	
1990	HFH	15.7	3.11
	HSH	12.67	

As can be seen from the information reproduced from Table 7-44, the PM_{10} increment consumption modeling demonstrates compliance with the allowable increment.

SO_2 Increment Consumption:

Table 7-45 from the *REVISED AIR QUALITY ANALYSIS*: SO_2 Increment Consumed

Averaging Times	GM PLUS NAAQS SOURCES IMPACTS ug/m^3	Class II Increment ug/m^3
3 Hr HSH	479.77	512
24 Hr HSH	86.98	91
Annual	16.39	20

Based on the results in Table 7-45, the SO_2 increment consumed is in compliance with the allowable Class II increments.

C. PSD REVIEW: (CONTINUED)

Air Quality Impact Analysis (Continued)

2. NAAQS: (Continued)

NOx Increment Consumption:

Table 7-46 from the *REVISED AIR QUALITY ANALYSIS*: NOx Increment Consumed

Averaging Times	GM PLUS NAAQS SOURCES IMPACTS ug/m^3	Class II Increment ug/m^3
Annual	12.43	25

Based on the results in Table 7-46, the NO_X increment consumed is in compliance with the allowable Class II increments.

Conclusion of modeling:

The results that are listed are from the modeling done by Kentuckiana Engineering, for the submittal of the Title V / PSD application to the Division. A review of the modeling by Mr. Stanley Krivo, US EPA, Region IV, revealed numerous deficiencies. Those deficiencies were addressed by Kentuckiana Engineering, and the final analysis submitted on May 9, 2006 for review by Mr. Krivo. The Division for Air Quality's modeling expert has reviewed all modeling information submitted in the application and addenda that have been submitted by Kentuckiana Engineering on behalf of Gallatin Materials since the public notice and are satisfied with the conclusions.

Class I Area Impacts:

The Gallatin Materials site will be located approximately 207 KM from the nearest edge of Mammoth Cave National Park, no additional designated class I areas are within 300KM of the Facility. After reviewing Gallatin Materials PSD application, the National Park Service has concluded that they do not anticipate the emissions from the proposed facility will have any significant impacts on the air quality related values at Mammoth Cave National Park.

Air Quality Impact Analysis (Continued)

Modeling Results - Air Toxics Analysis

Toxic air pollutants have been addressed in Section 10.1 of the **REVISED AIR QUALITY ANALYIS** using the Region 9 PRG Tables for comparison. Table 10-1 shows the predicted emissions of air toxics for GM and Table 10-2 shows the impacts of each air toxic modeled as compared to the Region 9 PRG values where available.

The Division for Air Quality's modeling expert has, since the public notice of the Draft Permit, reviewed all modeling information submitted in the application and addenda that have been submitted by Kentuckiana Engineering on behalf of Gallatin Materials since the public notice and is satisfied with the conclusions.

Additional Impact Analyses

Construction and related emissions:

Project related air quality impacts during construction are expected to include fugitive dust emissions from ground excavation, cut-and-fill operations, removal of debris, as well as vehicle emissions. However, because the construction period is limited and activities change during the construction phases, these emissions are only temporary and vary through out the period. The regulation 401 KAR 63:010, Fugitive emissions, applies to the fugitive dust. Section 3 of the regulation requires the permittee to take all the precautions to prevent particulate matter from becoming airborne.

Growth Analysis:

Gallatin Materials is expected to positively impact employment in the area. During the construction phase, peak employment is forecast to reach 100 employees. Projected employment reflecting full time jobs directly tied to the operation of GM is estimated to involve 25 employees. These employment opportunities and the economic activity generated by GM will result in additional secondary employment activities. The employment activity is expected to result in residential and commercial growth in the immediate vicinity of the plant. This increase in economic activity will result in secondary air emissions (i.e. increased vehicular use) but is not expected to significantly impact air quality.

Soils and Vegetation Impacts Analysis:

The NAAQA are intended to protect the public welfare from adverse effects of airborne emissions. This protection extends to agricultural soil. As demonstrated in Section 7.8.4 of the Gallatin Materials permit application the predicted maximum annual average concentration from the proposed facility throughout the study area are below the NAAQS.

C. PSD REVIEW: (CONTINUED)

Air Quality Impact Analysis (Continued)

Additional Impact Analysis (Continued)

Visibility Impairment Analysis:

As previously indicated, Gallatin Materials performed CALPUFF/CALMET modeling to determine visibility impacts on Mammoth Cave National Park, a Class I area. Results of that modeling indicated only one day over the five year modeling period that exceeded an extinction change of over 5%. The National Forest Service was contacted regarding visibility analyses for Class II areas. The Forest Service indicated that visibility analyses were not indicated for those areas in this case.

PERIODIC MONITORING:

Due to the product produced at Gallatin Materials, LLC, it is imperative that the monitoring requirements listed in the permit be followed to ensure that any problem resulting from a control or equipment malfunction/failure is minimized as much as possible.

CREDIBLE EVIDENCE:

This permit contains provisions which require that specific test methods, monitoring or recordkeeping be used as a demonstration of compliance with permit limits. On February 24, 1997, the U.S. EPA promulgated revisions to the following federal regulations: 40 CFR Part 51, Sec. 51.212; 40 CFR Part 52, Sec. 52.12; 40 CFR Part 52, Sec. 52.30; 40 CFR Part 60, Sec. 60.11 and 40 CFR Part 61, Sec. 61.12, that allow the use of credible evidence to establish compliance with applicable requirements. At the issuance of this permit, Kentucky has only adopted the provisions of 40 CFR Part 60, Sec. 60.11 and 40 CFR Part 61, Sec. 61.12 into its air quality regulations.